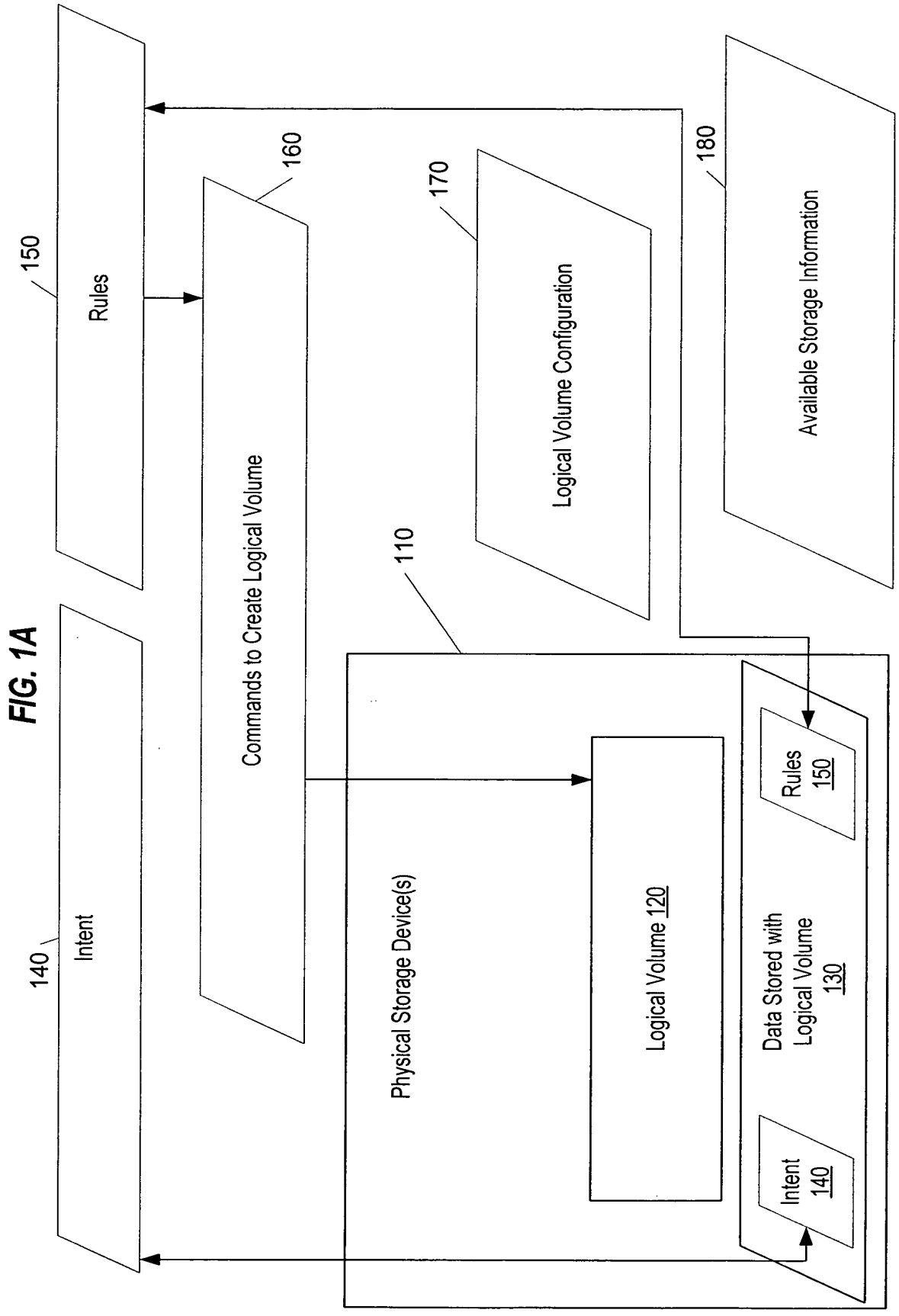
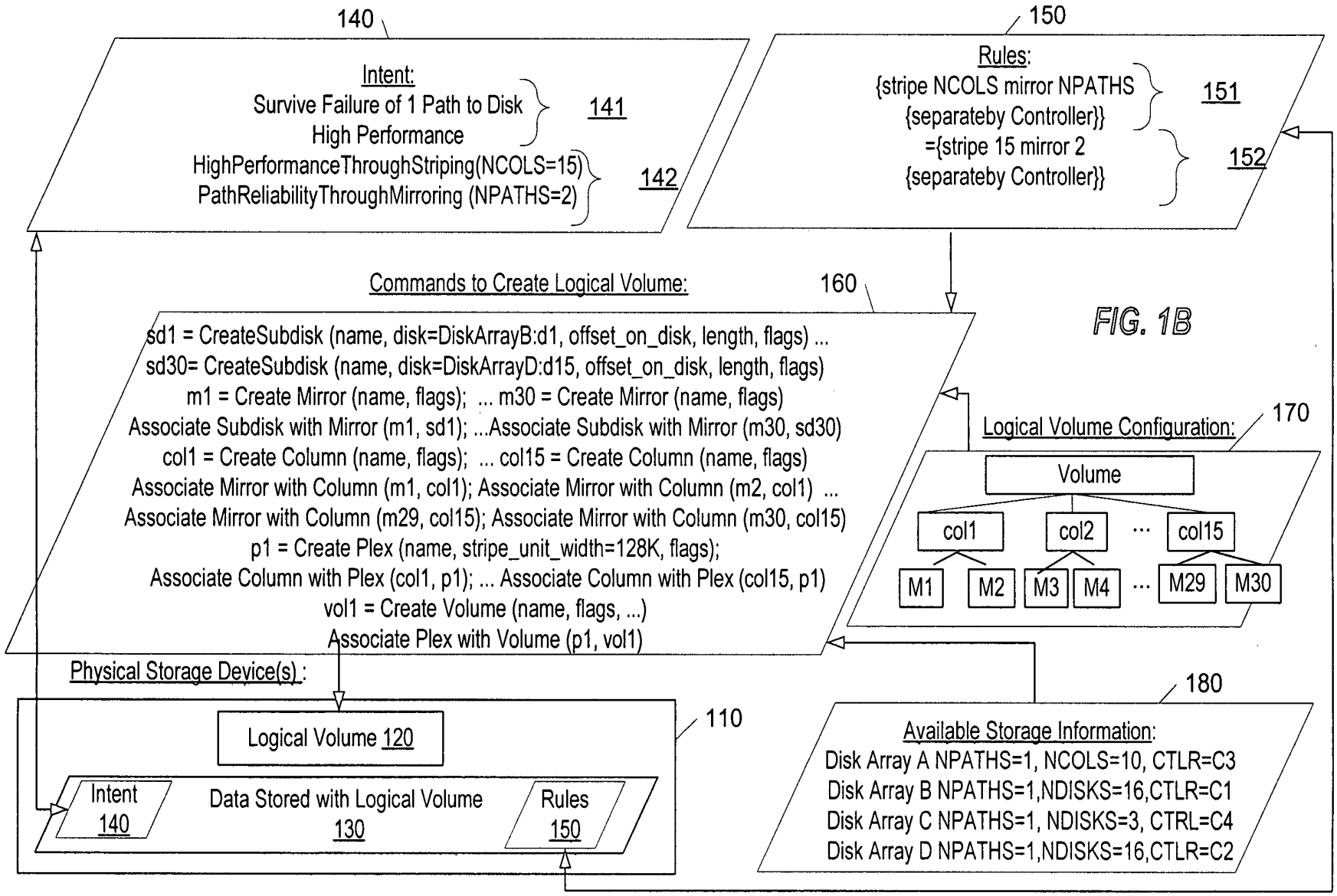

150
Rules
160
Commands to Create Logical Volume
170
Logical Volume Configuration
180
Available Storage Information
140
Intent
110
Physical Storage Device(s)
Logical Volume 120
Data Stored with Logical Volume 130
Rules 150
Intent 140

FIG. 1A


140
Intent:
Survive Failure of 1 Path to Disk
High Performance
141
HighPerformanceThroughStriping(NCOLS=15)
PathReliabilityThroughMirroring (NPATHS=2)
142
150
Rules:
{stripe NCOLS mirror NPATHS
{separateby Controller}}
151
={stripe 15 mirror 2
{separateby Controller}}
152
Commands to Create Logical Volume:
160
sd1 = CreateSubdisk (name, disk=DiskArrayB:d1, offset_on_disk, length, flags) ...
sd30= CreateSubdisk (name, disk=DiskArrayD:d15, offset_on_disk, length, flags)
m1 = Create Mirror (name, flags); ... m30 = Create Mirror (name, flags)
Associate Subdisk with Mirror (m1, sd1); ...Associate Subdisk with Mirror (m30, sd30)
col1 = Create Column (name, flags); ... col15 = Create Column (name, flags)
Associate Mirror with Column (m1, col1); Associate Mirror with Column (m2, col1) ...
Associate Mirror with Column (m29, col15); Associate Mirror with Column (m30, col15)
p1 = Create Plex (name, stripe_unit_width=128K, flags);
Associate Column with Plex (col1, p1); ... Associate Column with Plex (col15, p1)
vol1 = Create Volume (name, flags, ...)
Associate Plex with Volume (p1, vol1)
FIG. 1B
Logical Volume Configuration:
170
Volume
col1
col2
...
col15
M1
M2
M3
M4
...
M29
M30
Physical Storage Device(s) :
110
Logical Volume 120
Intent
140
Data Stored with Logical Volume
130
Rules
150
180
Available Storage Information:
Disk Array A NPATHS=1, NCOLS=10, CTLR=C3
Disk Array B NPATHS=1,NDISKS=16,CTLR=C1
Disk Array C NPATHS=1, NDISKS=3, CTRL=C4
Disk Array D NPATHS=1,NDISKS=16,CTLR=C2

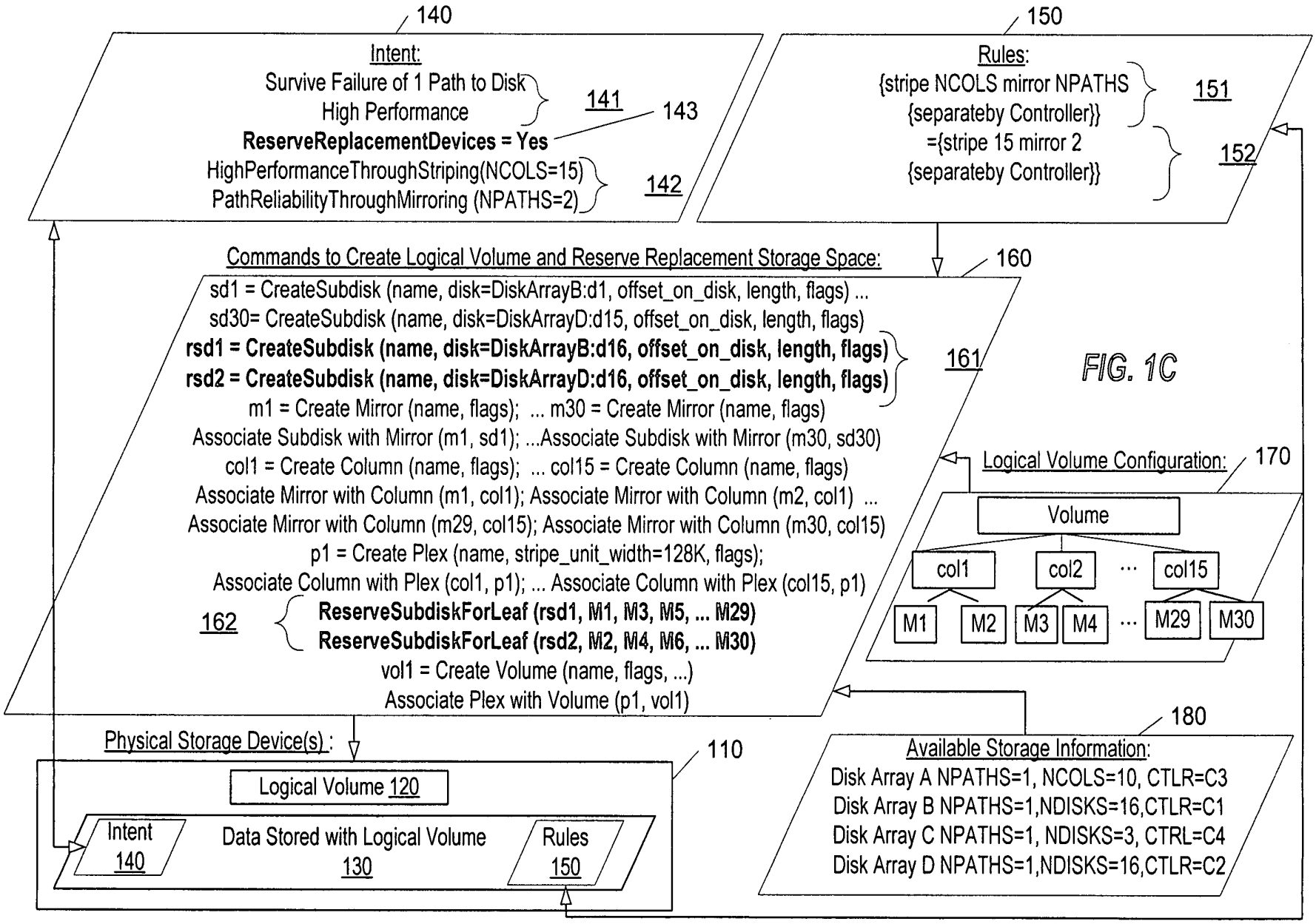


FIG. 1C

Attorney Docket No.: VRT0107US
First Named Inventor: Chirag Deepak Dalal
Title: Identification For Reservation Of Replacement Storage Devices For A Logical Volume To Satisfy Its Intent

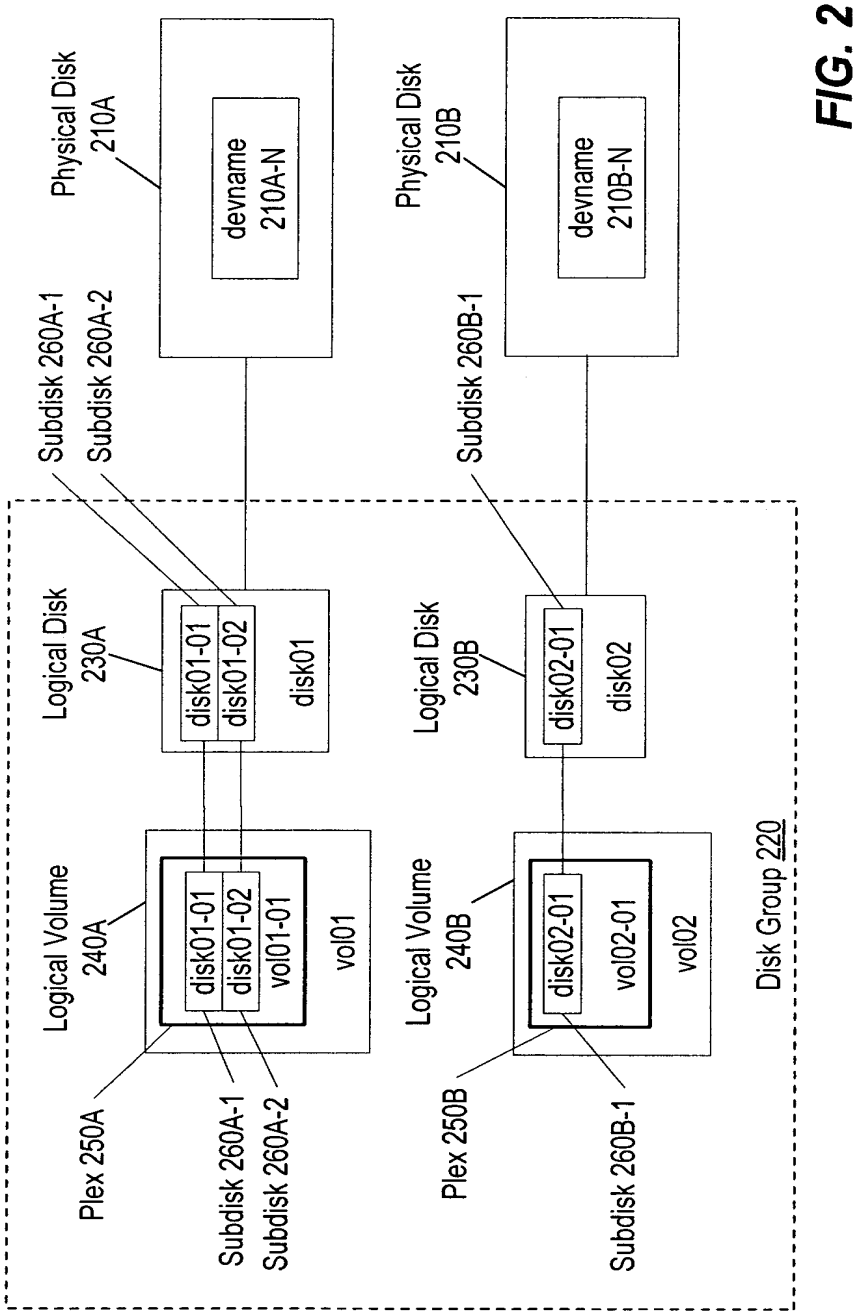

Physical Disk 210A
devname 210A-N
Physical Disk 210B
devname 210B-N
Subdisk 260A-1
Subdisk 260A-2
Subdisk 260B-1
Logical Disk 230A
disk01-01
disk01-02
disk01
Logical Disk 230B
disk02-01
disk02
Logical Volume 240A
disk01-01
disk01-02
vol01-01
vol01
Logical Volume 240B
disk02-01
vol02-01
vol02
Plex 250A
Subdisk 260A-1
Subdisk 260A-2
Plex 250B
Subdisk 260B-1
Disk Group 220

FIG. 2

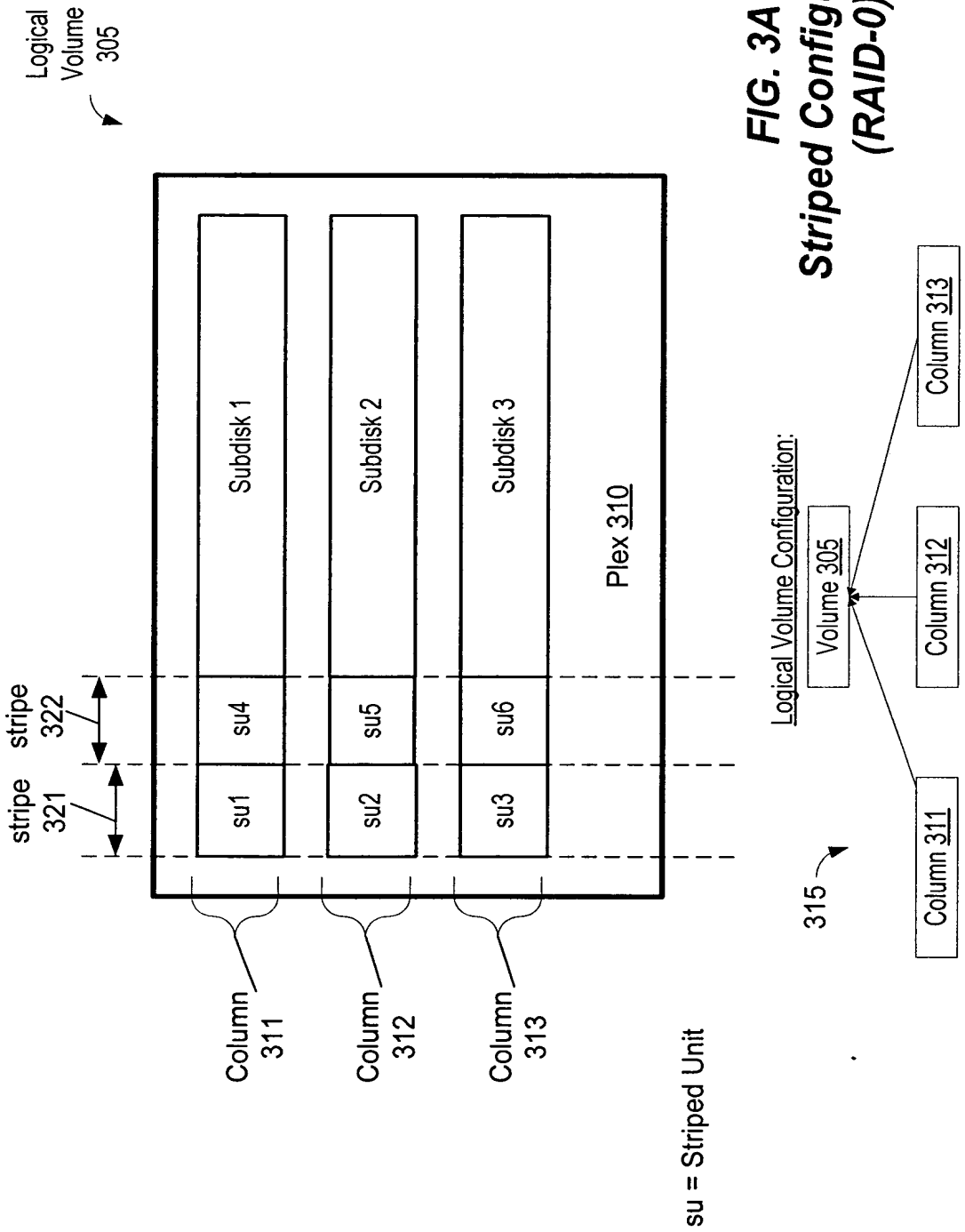
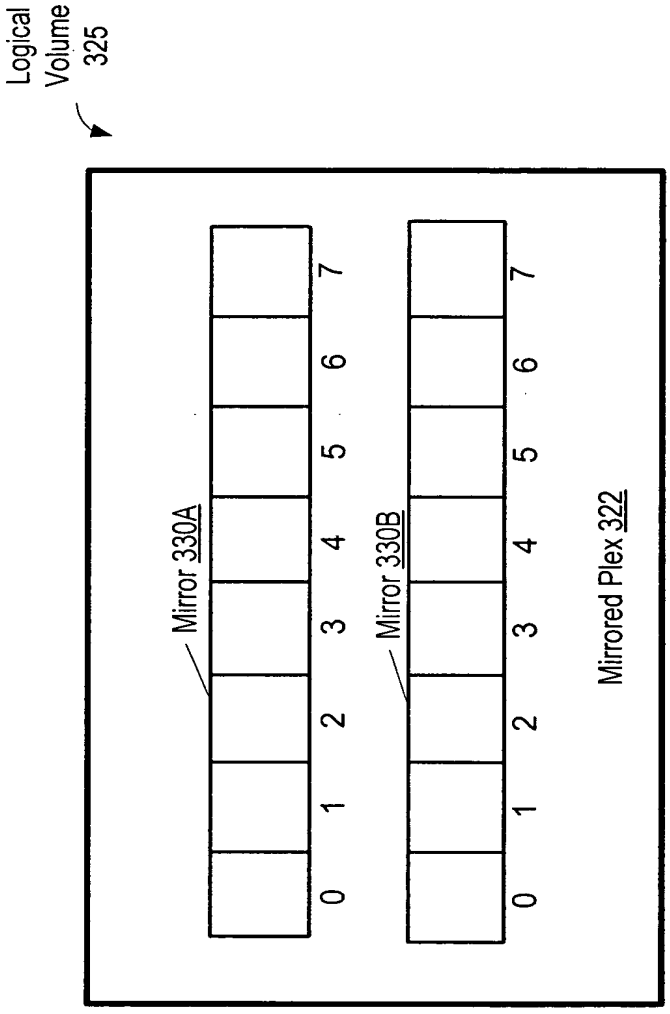


FIG. 3A
Striped Configuration (RAID-0)



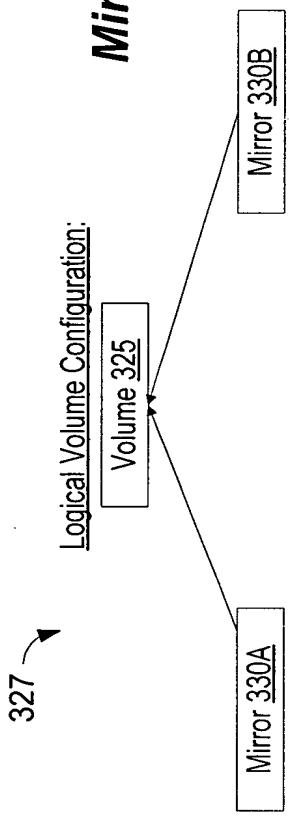


FIG. 3B
Mirrored Configuration (RAID-1)

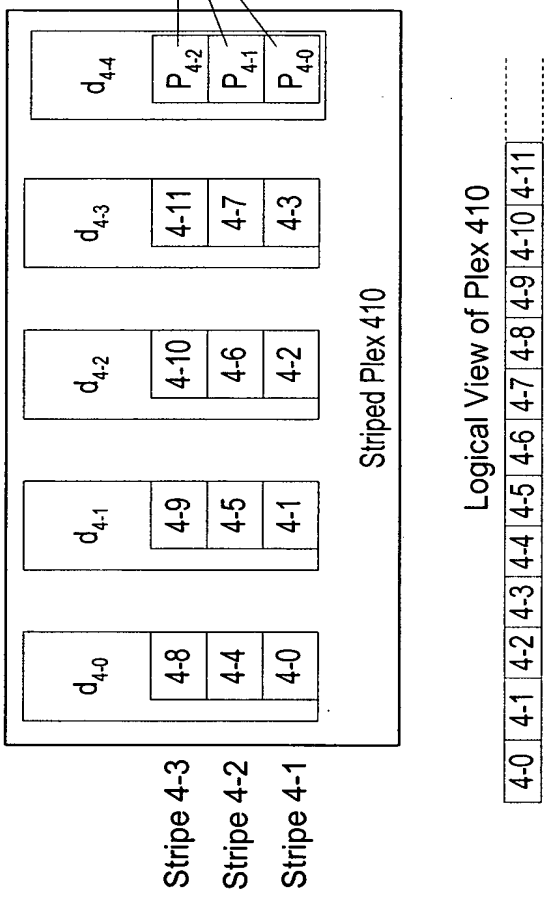


FIG. 4
RAID-3

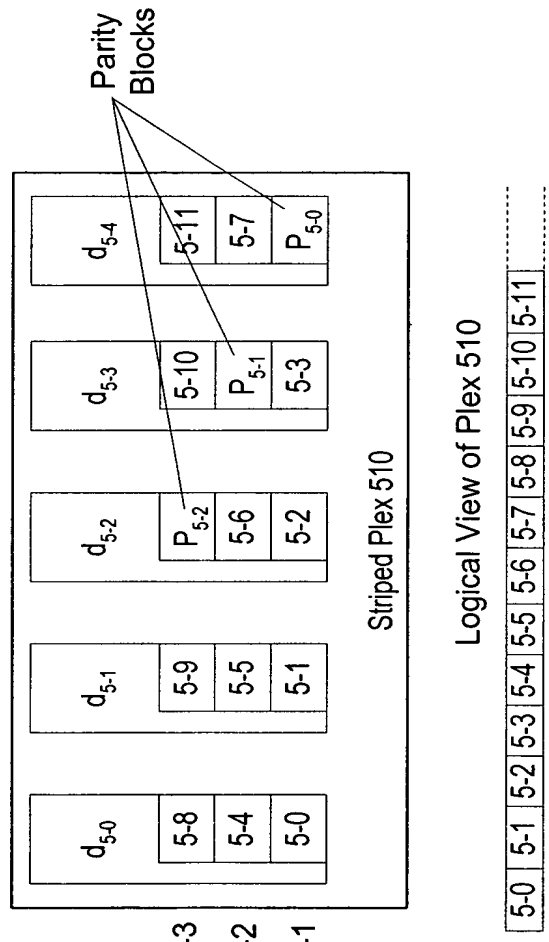


FIG. 5
RAID-5

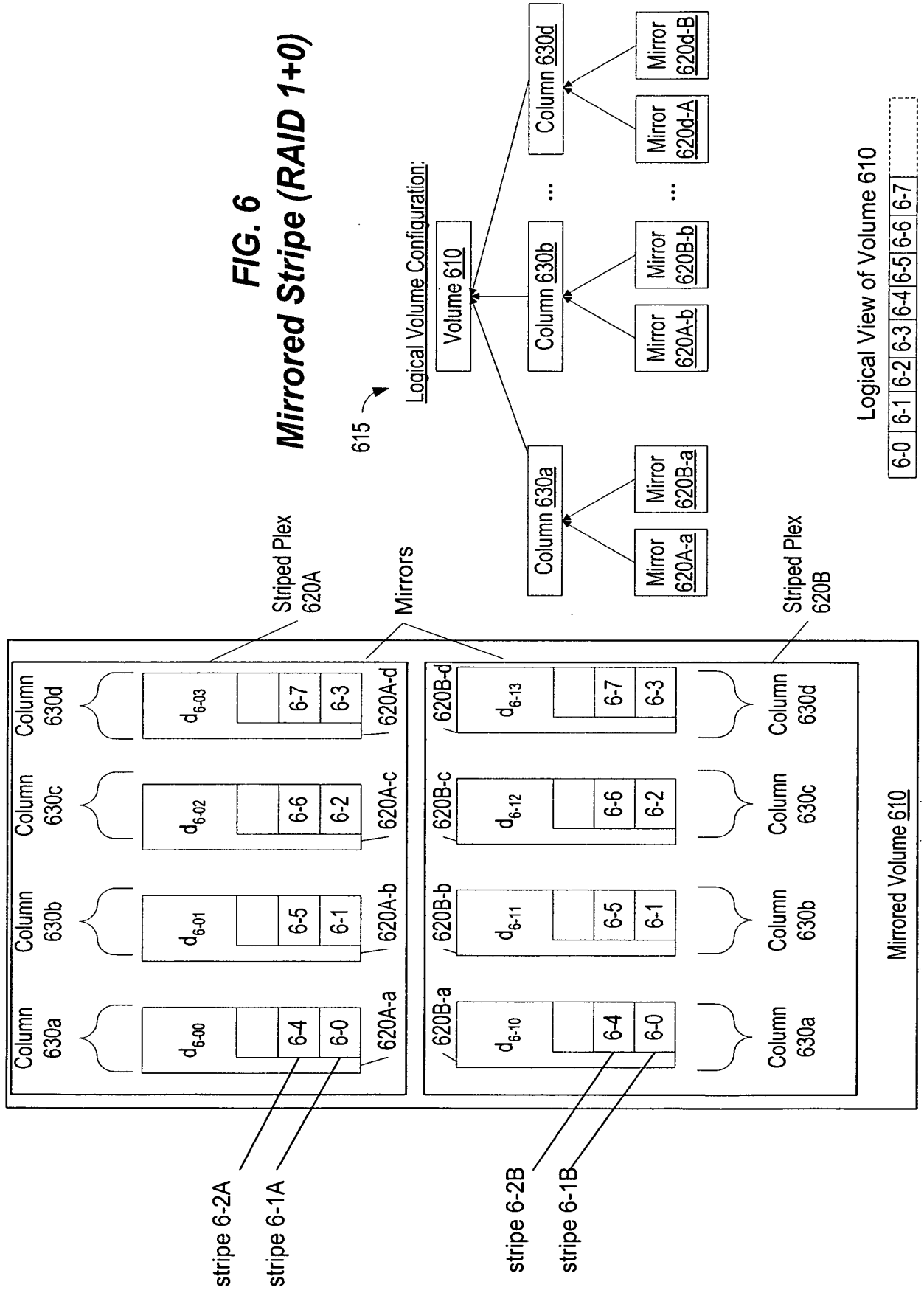


FIG. 6
Mirrored Stripe (RAID 1+0)
615
Logical Volume Configuration:
Volume 610
Column 630a
Column 630b
Column 630d
Mirror 620A-a
Mirror 620B-a
Mirror 620A-b
Mirror 620B-b
Mirror 620d-A
Mirror 620d-B
Logical View of Volume 610
6-0 6-1 6-2 6-3 6-4 6-5 6-6 6-7
Striped Plex 620A
Mirrors
Striped Plex 620B
Mirrored Volume 610
Column 630a
Column 630b
Column 630c
Column 630d
620A-a
620A-b
620A-c
620A-d
620B-a
620B-b
620B-c
620B-d
d_{6-00}
d_{6-01}
d_{6-02}
d_{6-03}
d_{6-10}
d_{6-11}
d_{6-12}
d_{6-13}
6-0 6-1 6-2 6-3 6-4 6-5 6-6 6-7
stripe 6-2A
stripe 6-1A
stripe 6-2B
stripe 6-1B

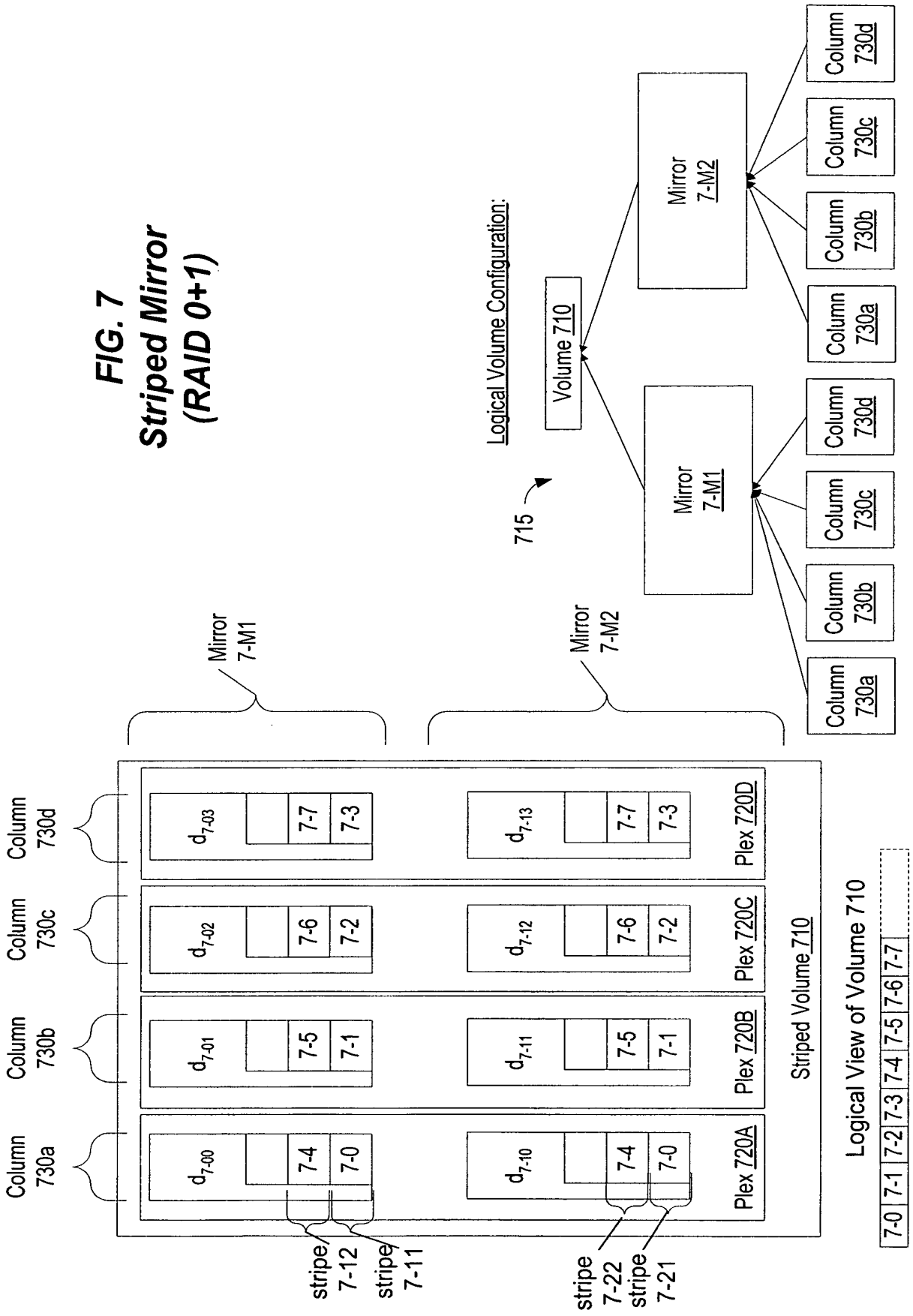


FIG. 7
Striped Mirror
(RAID 0+1)

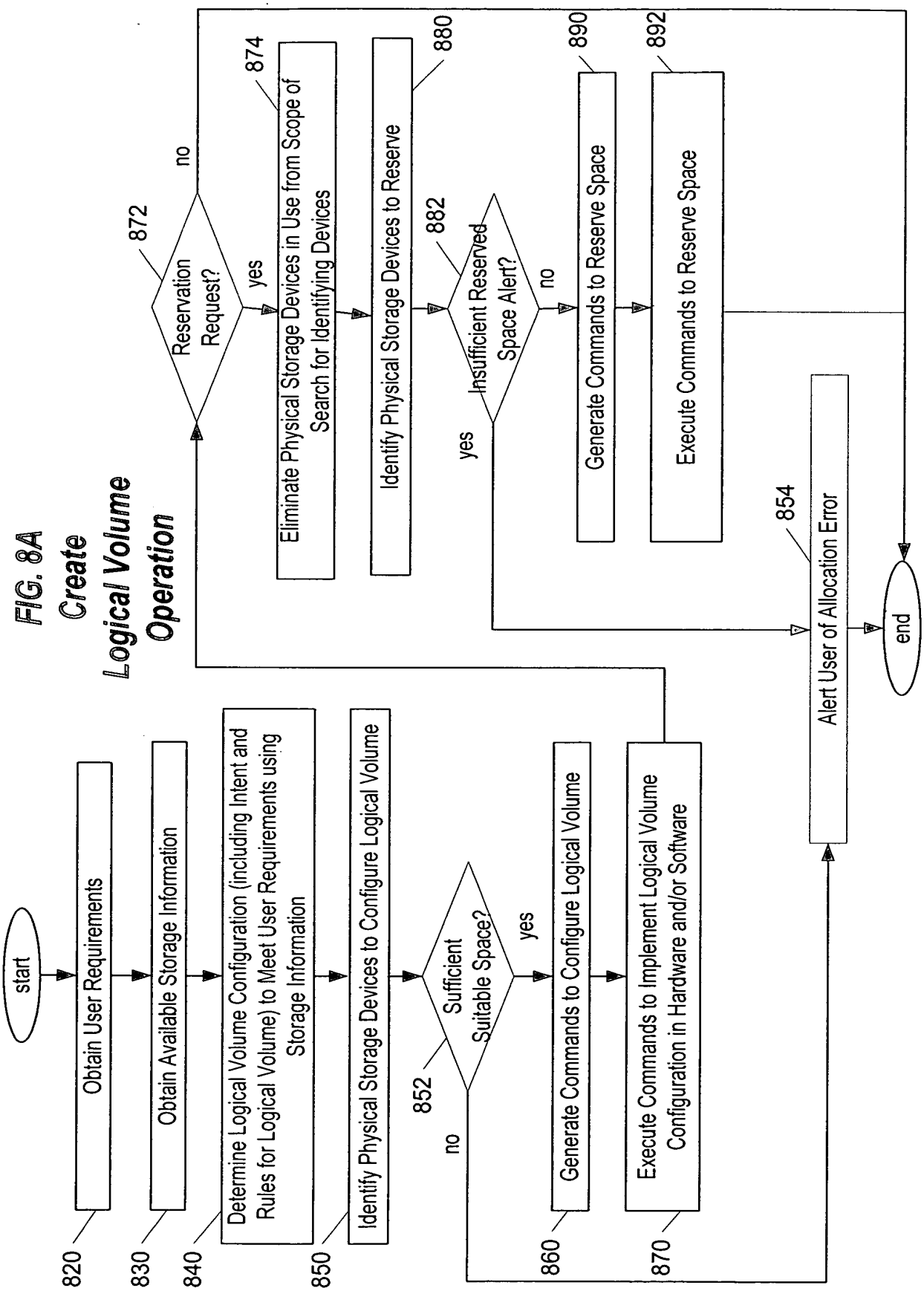


FIG. 8A
Create Logical Volume Operation

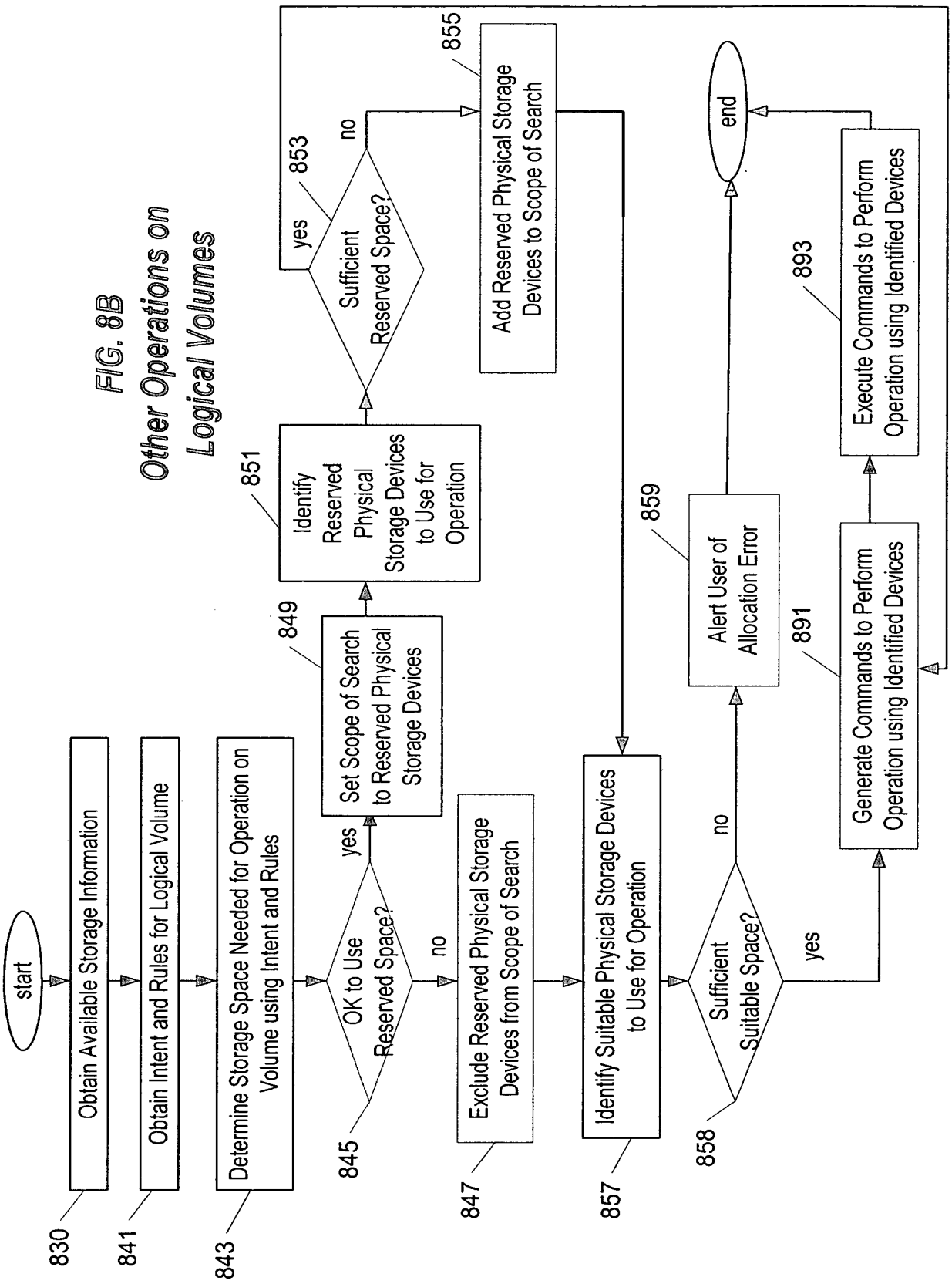


FIG. 8B
Other Operations on Logical Volumes

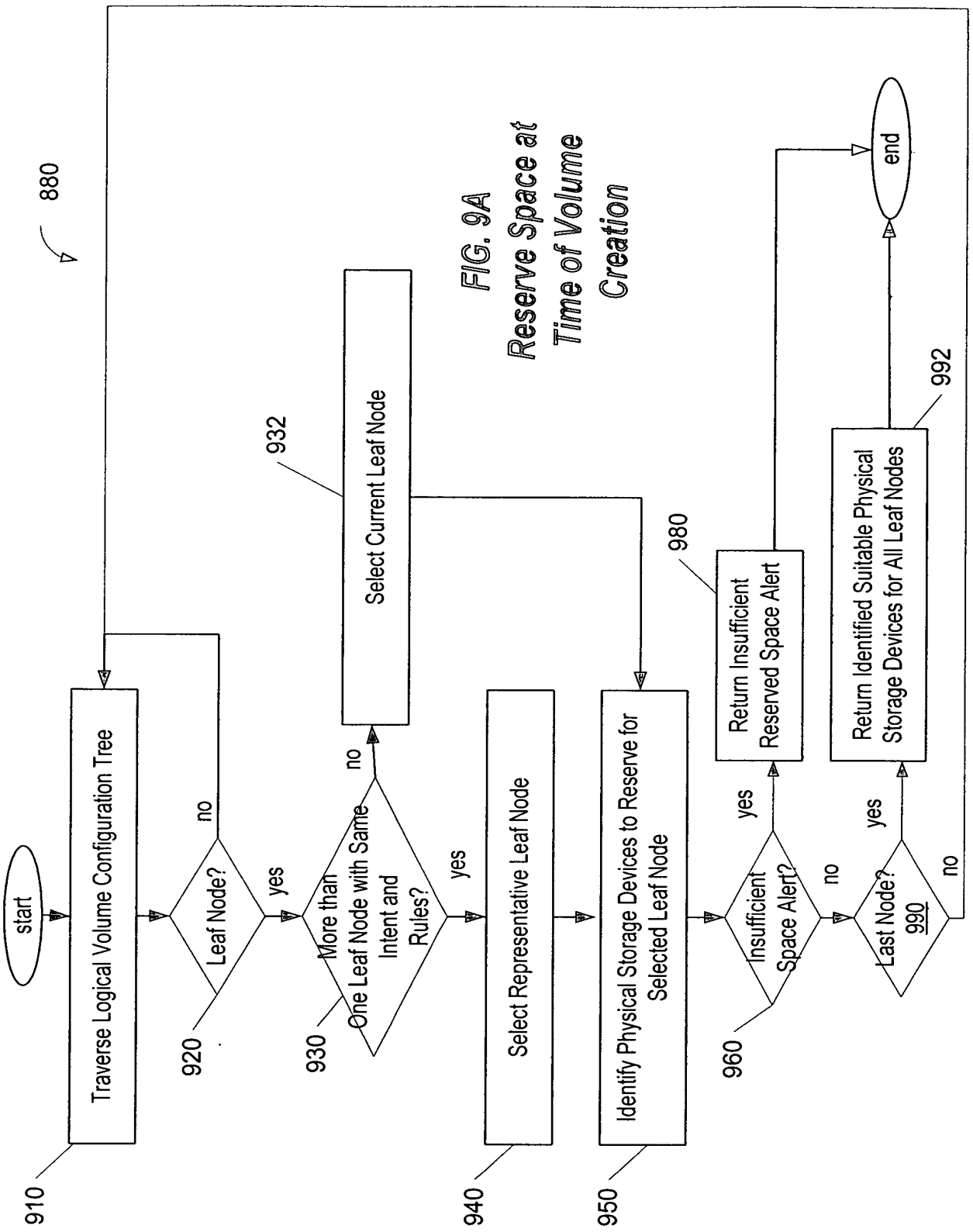
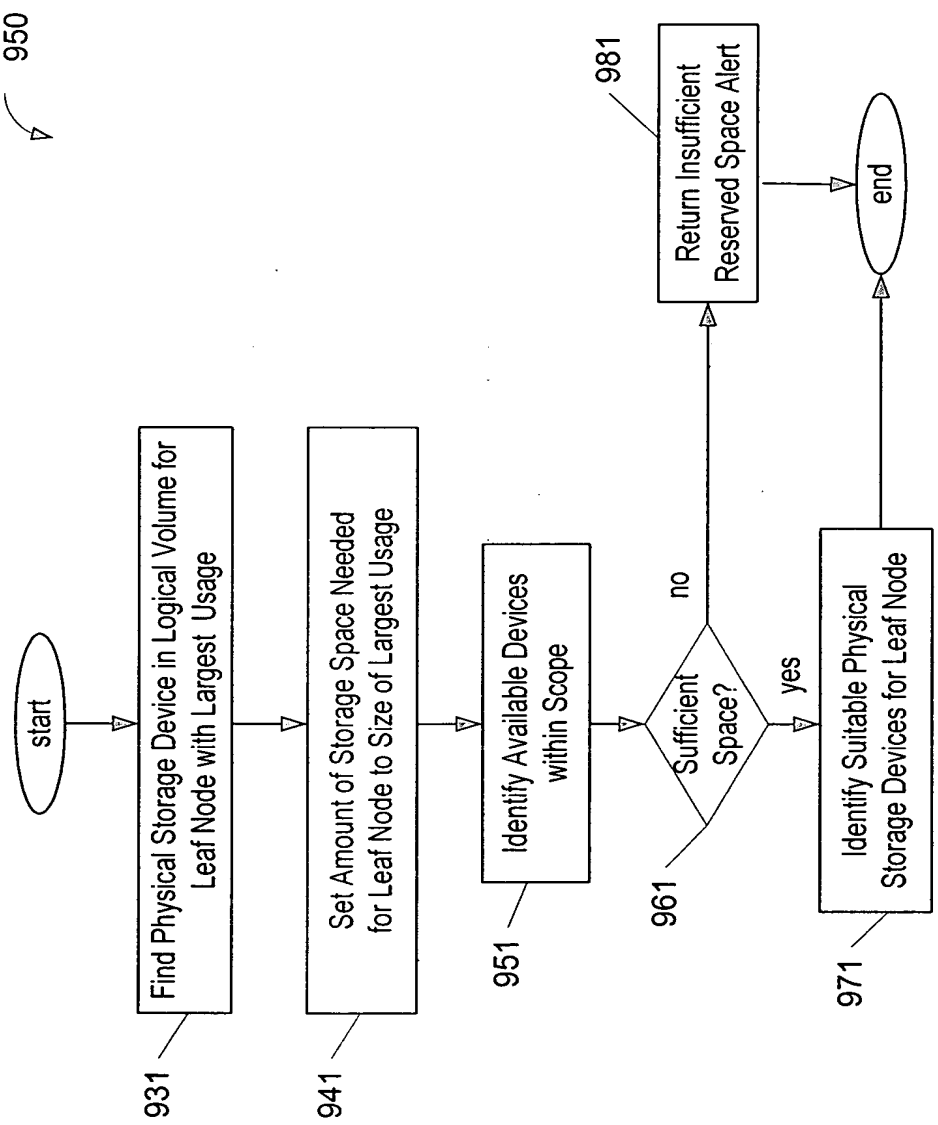


FIG. 9A
Reserve Space at Time of Volume Creation

FIG. 9B
Identify Physical Storage Devices for Leaf Node



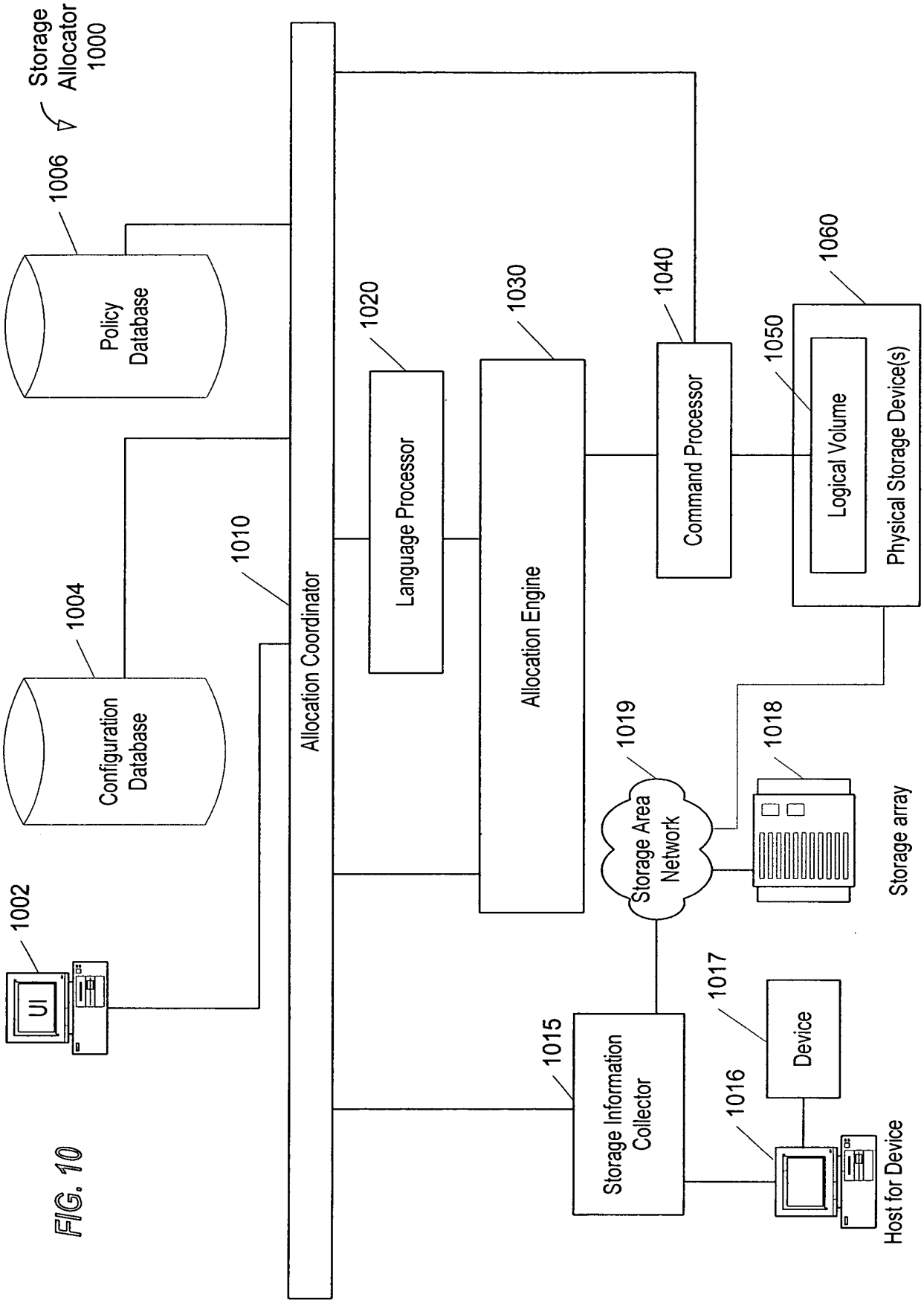

Storage Allocator 1000
1006
Policy Database
1004
Configuration Database
1002
UI
1010
Allocation Coordinator
1020
Language Processor
1030
Allocation Engine
1040
Command Processor
1050
Logical Volume
1060
Physical Storage Device(s)
Storage array
1019
Storage Area Network
1018
1015
Storage Information Collector
1017
Device
1016
Host for Device

FIG. 10

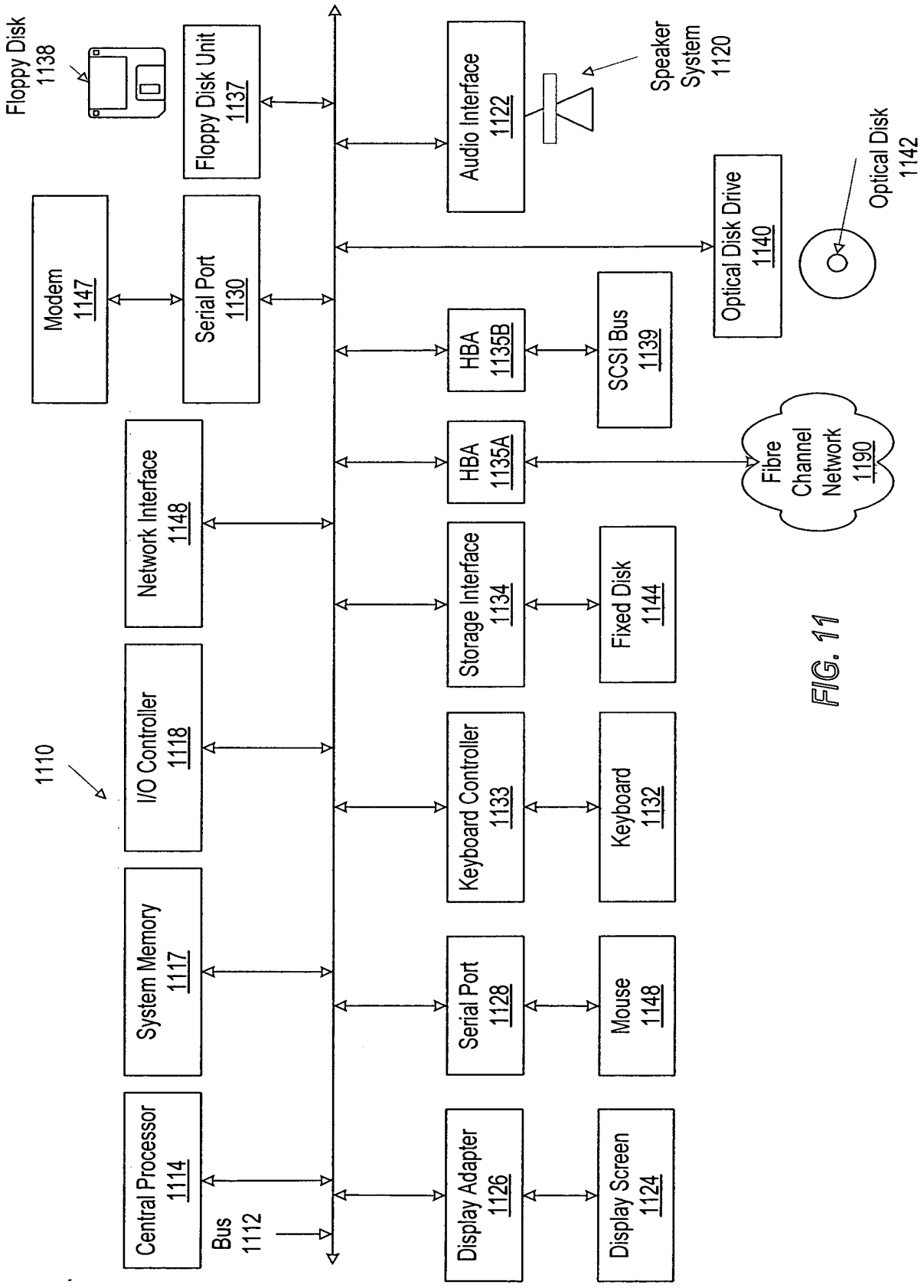

Floppy Disk 1138
Floppy Disk Unit 1137
Audio Interface 1122
Speaker System 1120
Modem 1147
Serial Port 1130
Optical Disk Drive 1140
Optical Disk 1142
HBA 1135B
SCSI Bus 1139
HBA 1135A
Fibre Channel Network 1190
Network Interface 1148
Storage Interface 1134
Fixed Disk 1144
1110
I/O Controller 1118
Keyboard Controller 1133
Keyboard 1132
System Memory 1117
Serial Port 1128
Mouse 1148
Central Processor 1114
Bus 1112
Display Adapter 1126
Display Screen 1124

FIG. 11

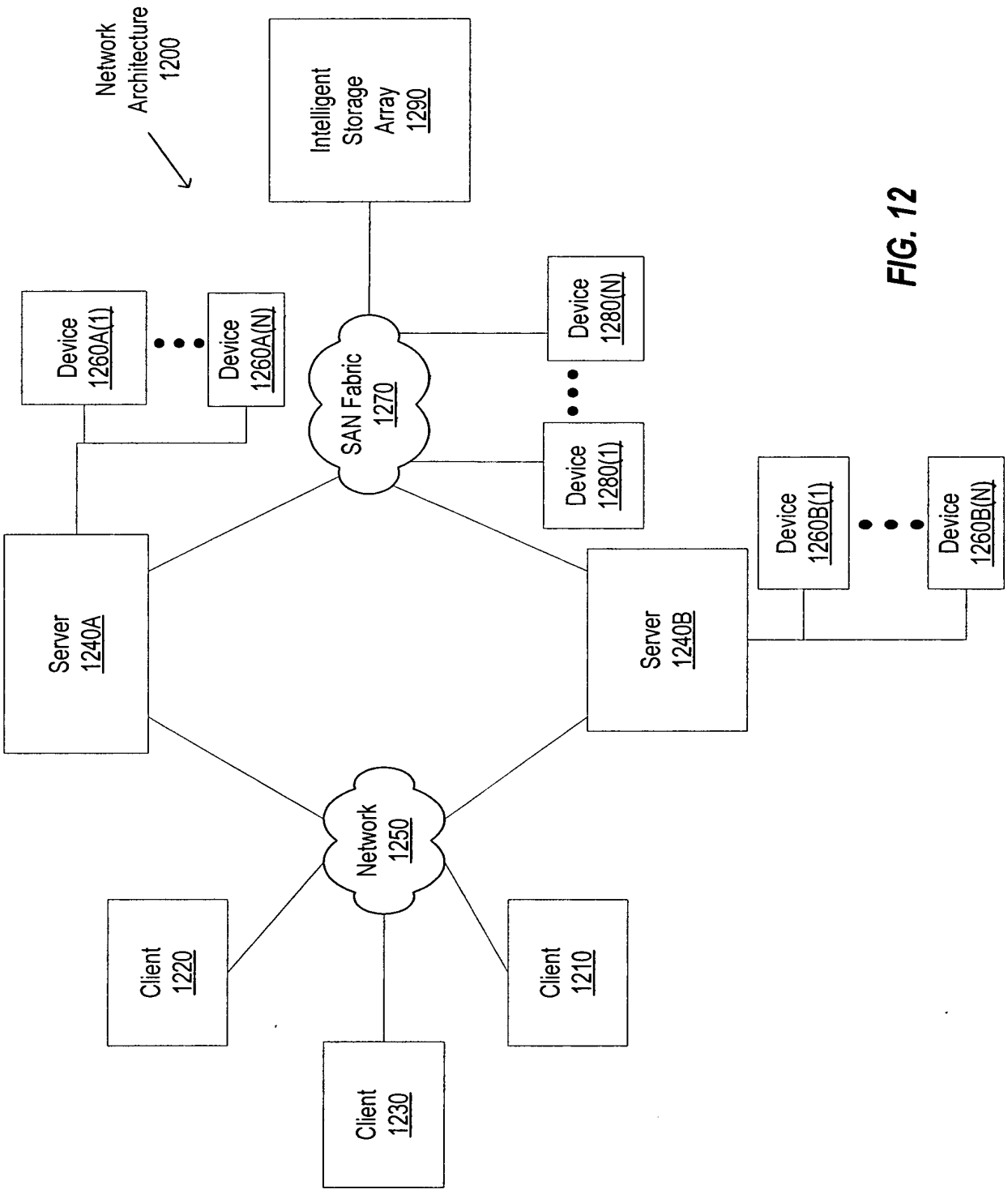

Network Architecture 1200
Intelligent Storage Array 1290
SAN Fabric 1270
Device 1260A(1)
Device 1260A(N)
Device 1280(N)
Device 1280(1)
Device 1260B(1)
Device 1260B(N)
Server 1240A
Server 1240B
Network 1250
Client 1220
Client 1210
Client 1230

FIG. 12